LUCCi Land Use and Climate Change Interactions in Central Vietnam

Karlsruher Institut für Technologie

Coupled hydrological - economic modeling for optimal agricultural cultivation in the VuGia-ThuBon river basin, Central Vietnam

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Motivation and Objectives

- Climate change is expected to have strong impacts on water resources which, in turn, will put more pressure on water management as well as agriculture activities in VGTB river basin. Hence, efficient use and economically sound allocation of water resources are of crucial importance.
- This study aims to investigate irrigated agriculture under current and future scenarios of water availability. A case study is conducted in Hiep Duc district, Quang Nam province.

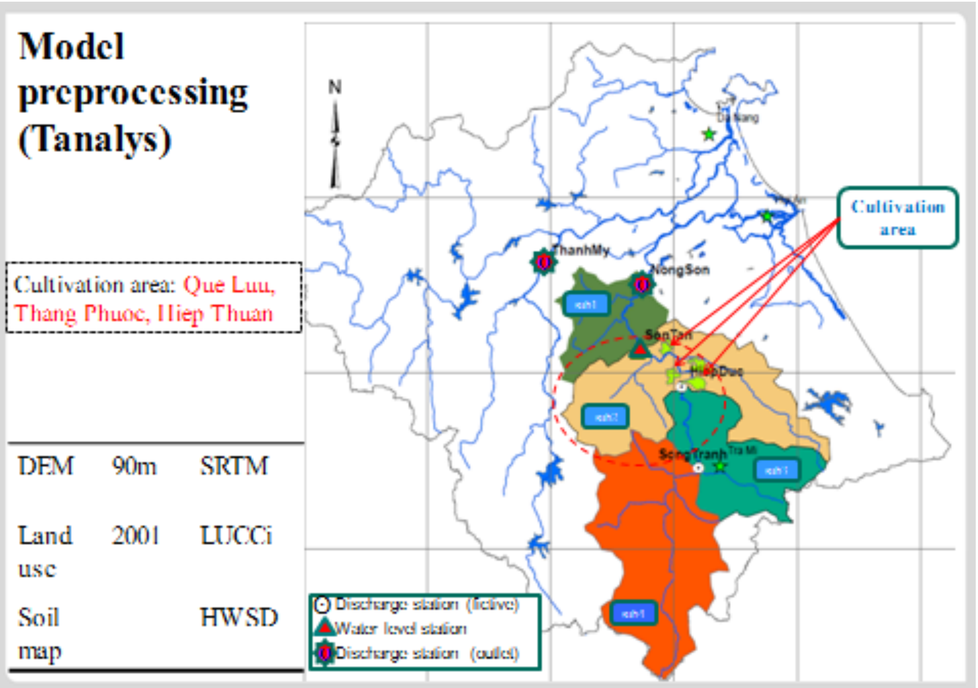
Research questions

- What are the expected impacts of future climate change on water availability in the VGTB basin?
- Can we reliably model the dependence between water availability and the agricultural activities?
- What are the biophysically and economically feasible irrigation strategies under present and future conditions

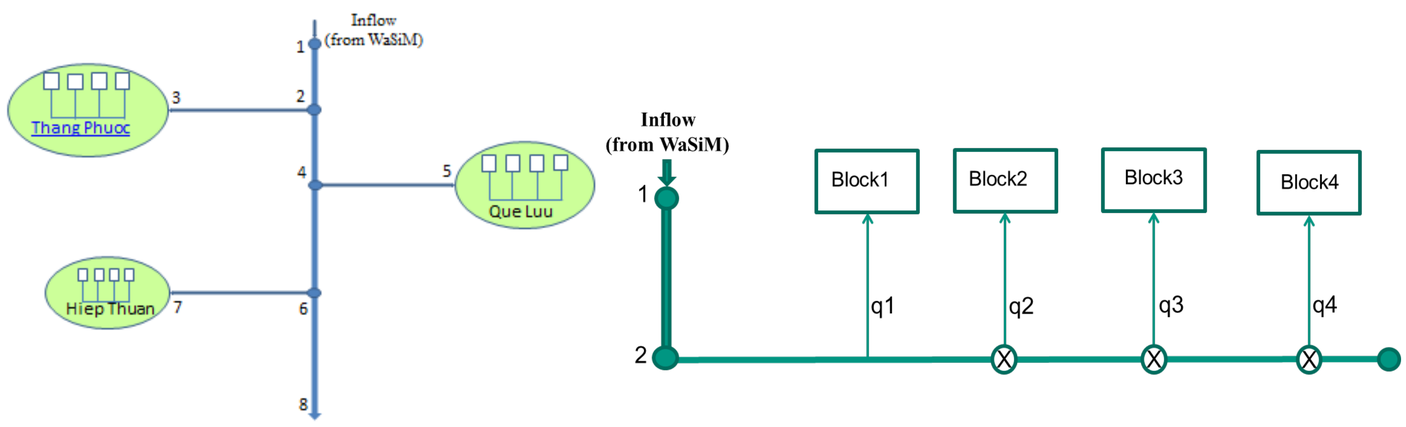
Method

Model calibration (WaSiM –ETH)

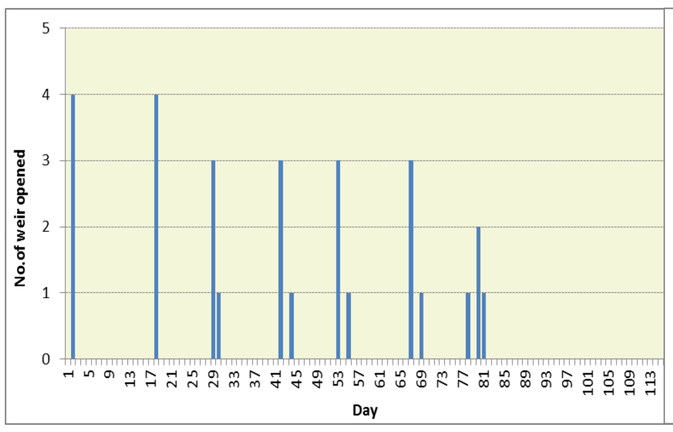
Model preprocessing (Tanalys)

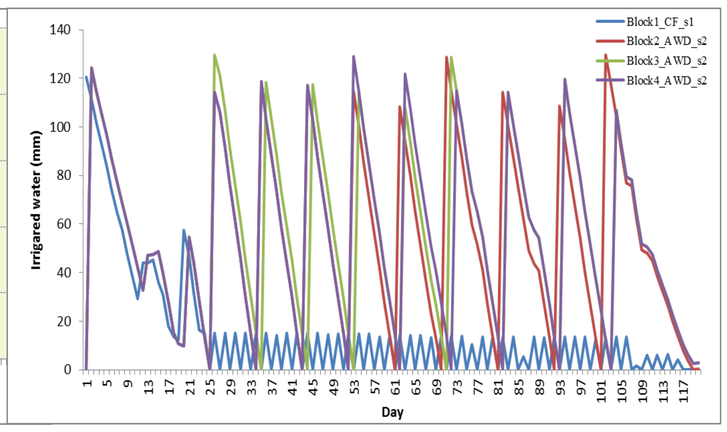


Economic optimisation (GAMS)



Selected results





Assumptions: q_b = 1m^3/s, rice price = 0,2 USD/kg, area of each block = 25ha. Yield for AWD constant, yield for CF alters

Yield (assumed) (Kg/ha) for different techniques	Profit (USD)	Irrigation technique		
		Primary canal 2,3 (Thang Phuoc)	Primary canal 4,5 (Que Luu)	Primary canal 6,7 (Hiep Thuan)
CF = 4500 AWD = 5000	11,200	4 blocks for CF	1 block for CF, 3 for AWD	3 blocks for CF, 1 for AWD
CF = 5000 AWD = 5000	12,000	4 blocks for CF	4 blocks for CF	4 blocks for CF
CF = 5500 AWD = 5000	13,200	4 blocks for CF	4 blocks for CF	4 blocks for CF

More water, more profit !

Summary

- Climate data from WRF simulations driven by ERA40 reanalysis were used for this research due to lack of climate observations. → Future climate projections will be used in the next step.
- Results showed a good agreement between observed and simulated runoffs in periods with low and high runoff dynamics.
- GAMS model can provide appropriate irrigation technique and irrigational schedule based on (future) water availability. → Field studies are being conducted to negotiate this studies with local stakeholders and check the assumptions.

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